Maine Yankee

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UNITED STATES NUCLEAR REGULATORY COMMISSION
ATTN: Document Control Desk
Washington, DC 20555

References: (1) NRC Integrated Inspection No. 05000309/2003001 and Notice of Violation, dated June 24, 2003
(2) FSAR – UMS Universal Storage System, Docket No. 72-1015, Revision 0
(3) NRC Certificate of Compliance No. 1015, Amendment No. 2

Subject: License No. DPR-36 (Docket No. 50-309, ISFSI Docket No. 72-030)
Reply to Notice of Violation

Gentlemen:

By Reference 2, NRC issued a notice of violation (NOV) to the Maine Yankee facility. The NOV concerned a failure to request an amendment to the Technical Specifications contained in the certificate of compliance (CoC) for the dry fuel storage containers employed by Maine Yankee.

Maine Yankee respectfully denies this violation based on the following.

Background

1. Icing Event

In February 2003, Maine Yankee discovered a condition unanticipated by itself, the dry storage container vendor and the regulator. The vertical concrete cask (VCC) bearing surfaces were covered by ice. In some cases 80-95% of the surfaces were covered with an ice layer ranging between 1/16 –1/4 inch thick. The VCCs examined had a clean central surface area ranging between 5 – 15 ft^3 and all of the VCCs had a considerable buildup of ice (i.e., a ridge) around the outer diameter of the VCCs.

Maine Yankee entered the icing condition into its corrective action program and began an evaluation of the condition to determine its nuclear safety significance and effect upon the current license basis.

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2. Relevant License Basis

Through its corrective action process, Maine Yankee examined several aspects of the then current license basis to determine their relevancy to the iced condition.

The FSAR (Reference 2), in sections 11.2.8 and 11.2.15.1.4 provides analyses of the effect on a VCC of a design basis seismic event and a Maine Yankee-specific beyond design basis seismic event, respectively. Each analysis uses identical methodologies, varying only the magnitude of the seismic event. In each case, the "success" criterion was to demonstrate that the VCC would not slide under seismic conditions.[1] For the design basis seismic event it was demonstrated that a coefficient of friction between the VCC and concrete pad must exceed 0.30 to prevent sliding. For the beyond design basis seismic event, a coefficient of friction greater than 0.45 was necessary to prevent sliding.

As a result of the latter evaluation, a friction coefficient between the VCC and the concrete pad of 0.50 was placed in Section B.3.4.2.6 ("Maine Yankee Site Specific Parameters and Analyses") of the Technical Specifications associated with Reference 3:

> "Physical testing shall be conducted to demonstrate that the coefficient of friction between the CONCRETE CASK and ISFSI pad surface is at least 0.5."[2]

During its deliberation on the relevance of these license basis elements to the VCC icing condition, Maine Yankee concluded that they were irrelevant for two related reasons:

1. The pre-existing FSAR seismic analyses and resulting Technical Specification explicitly assumed contact between the VCC and the concrete pad which did not exist in the iced condition, and

2. As discussed more fully below, the "success" criterion of "no sliding" for the pre-existing FSAR/TS analyses could not be employed because there was no realistic way to calculate coefficients of friction between the VCC and the ice, and between the ice and the concrete pad.

[1] "No sliding" is a very conservative criterion and serves only to demonstrate that there will be no tip-over of the VCC. The FSAR also demonstrates explicitly and separately that tip-over will not occur under either of the seismic magnitudes addressed above. Finally, the FSAR analyzes a non-mechanistic tip-over event to demonstrate acceptable consequences (no release of radioactivity).

[2] As with the rest of the "verifications" required by Technical Specification Section B.3.4.2, Maine Yankee has conducted and documented testing "to demonstrate that the coefficient of friction between the CONCRETE CASK and ISFSI pad surface is at least 0.5." The adequacy of this testing has not been questioned in the notice of violation.

Instead of modifying the pre-existing FSAR analyses, Maine Yankee would have to analyze the actual iced condition utilizing the ultimate "success" criterion of "no tip-over", and then follow procedures and regulatory requirements to reach an acceptable resolution.[3]

Safety Significance of Iced Condition

To address the safety significance of the iced condition, Maine Yankee prepared a technical evaluation that was used as the basis for a 10CFR72.48 evaluation. In short, Maine Yankee determined that:

- The icing led to indeterminate coefficients of friction between the VCC and the ice, and between the ice and the concrete pad. However, this indeterminate condition should not be assumed to imply that such coefficients would be less effective than the VCC/concrete pad combination. While intuition could suggest that icing would result in an "effective" coefficient of friction less than that demonstrated for the VCC/concrete pad interaction, the frozen bond between the VCC/ice/pad and the substantial buildup of a ridge of ice around the outer diameter of the VCCs could significantly retard motion during a seismic event leading to an "effective" coefficient of friction well in excess of that demonstrated for the VCC/concrete pad.

- Using the Seismic Qualification Utility Group Seismic Experience Database supplemented by rigorous seismic analyses performed by Sandia in support of the Private Fuel Storage facility, Maine Yankee concluded that if there were any VCC sliding during a seismic event it would be minor, not allowing travel to the edge of the pad (i.e., no tip-over) or impact with another VCC. Therefore, the event was bounded by previous analyses (e.g., tip-over) and did not present any public health and safety concern.

Having determined acceptability of the icing condition from a safety viewpoint[4], to finalize the 10CFR72.48 process, Maine Yankee had to determine the effect of the new safety evaluation on the license basis.

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[3] It should be noted that this is not an unusual situation in nuclear power. From time to time licensees or the regulator identify generic safety issues that had not been anticipated by either party and are not part of the current license basis. These issues must simply be analyzed under appropriate processes, safety significance determined, corrective actions implemented appropriate to safety significance and, finally, changes to the license basis identified based upon regulation and policy (e.g., the criteria of the Technical Specification Improvement Program for additions to the Technical Specifications). What seems to be unusual in this case of VCC icing at Maine Yankee is that the NRC has not initiated any generic activity and Maine Yankee has been cited for a violation for identifying a generic issue and following established procedure.

[4] Neither in telephone discussions nor in the notice of violation has NRC questioned the appropriateness of Maine Yankee's safety conclusions.

License Basis Changes

1. FSAR

As discussed above, the FSAR is silent on VCC icing conditions, since it contains no evaluation related to that condition. Clearly the evaluation of the newly discovered iced condition represents a change to the 10CFR72.212 evaluation and the underlying FSAR, which should be reflected in both documents as required by 10CFR72.212. Accordingly, through the 10CFR72.48 process, Maine Yankee identified and made changes in each document by adding a new section describing the new seismic analysis associated with VCC icing.[5] Maine Yankee also added some clarifying statements to the FSAR, not required by regulation, to emphasize that the pre-existing FSAR seismic analyses did not have any relationship to the icing condition.

2. Technical Specifications (CoC)

Unlike the FSAR/72.212 evaluation, there are no relevant regulatory requirements directing that the Technical Specifications (TS) be changed due to the icing condition analysis. Indeed, there is regulatory policy that would direct no change be made to the TS.

First of all, the Maine Yankee icing evaluation applied only to the iced condition. As noted above, the FSAR beyond design basis seismic analysis and associated reference to a 0.5 coefficient of friction contained in TS B.3.4.2 were explicitly based on the direct contact between the VCC and ISFSI pad, and the condition of "no sliding" between the two. Neither of those conditions applied to Maine Yankee's new evaluation. In other words, the FSAR evaluations for direct contact between the VCC/concrete pad were in no way changed or invalidated by the icing evaluation and required no FSAR change. It was true and has always remained true that a friction coefficient of at least 0.5 exists between the VCC and the ISFSI pad (when they are in contact) and ensures there will be no sliding in a beyond design basis seismic event at Maine Yankee. The FSAR change was simply an addition to the FSAR to reflect new analyses[6] unrelated to the pre-existing information.

There is no regulatory requirement to reflect a new FSAR analysis into the TS. The mere presence of the result of a similar analysis in the TS (the .5 coefficient of friction to maintain "no sliding") does not imply that the results of any new seismic analysis (unrelated to the coefficient of friction) be included in the TS. In fact, the real test for including requirements in the TS has

[5] Strictly speaking, the FSAR has not been formally changed since that is the responsibility of the CoC holder (NAC, Intl.) and somewhat up to their judgment. Maine Yankee maintains an "interim" FSAR reflecting the analyses and 10CFR72.48 evaluations conducted between FSAR updates.

[6] "New analysis" does not imply "an accident of a different type" as used in 10CFR72.48. The bounding accident for the existing and new FSAR analyses is the same – a tip-over event.

to do with safety significance.[7] For instance, 10CFR72.44(c)(4) discusses those design features which should be in fuel storage TS:

> "Design features include items that would have a significant effect on safety if altered or modified, such as materials of construction and geometric arrangements."

Judgment is called for.

In the instant case, Maine Yankee based its judgment on the requirements of 10CFR72.44(c) and the principles in the Commission's "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors". [58FR139, page 39132] In developing the policy statement, the Commission recognized that TS had become top-heavy in requirements that had little, if any, nexus to safety. As a result the Commission policy statement set clear safety criteria that a proposed TS must meet in order to be included in the improved TS.

A brief summary of Maine Yankee's technical finding on the icing condition could be characterized as follows.

> There is no safety significance associated with VCC icing during a seismic event because movement of the VCC, if it occurred, would be so limited as to ensure no tip-over event by reaching the edge of the pad and no opportunity to impact other VCCs.

This conclusion does not meet the 10CFR72.44(c)(4) criterion for inclusion in the TS because there is no "significant effect on safety" nor does it meet the safety significance intent of the Commission's policy statement on TS. Coupled with the fact that the FSAR analysis for icing was for a new phenomenon not anticipated by the licensee, vendor or NRC and for an entirely different set of assumptions than the previous FSAR seismic analyses (and resulting TS B.3.4.2.6), there is no regulatory, safety or other basis for including anything associated with icing in the TS.[8]

Contrary to Maine Yankee's reasoned approach to determining if the icing condition should be reflected in the TS (which are part of the CoC), the NRC's notice of violation simply asserted that a CoC change was required.

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[7] If safety significance were not the test, the TS would be voluminous and replete with all the parameters included in initial conditions for all the safety analyses in the FSAR. Consider, for instance, just the ISFSI pad design basis parameters in FSAR section 11.2.15.1.1 which support the tip-over analysis – none of which appear in the TS.

[8] In fact, there is nothing to include in the TS anyway. The only addition to the TS that could make sense is a notation that VCC icing is not of safety significance during a seismic event. No one would argue that a statement of non-safety significance is required to be added to the TSs or constitutes a valid TS.

The statement of violation and discussions with NRC on this topic have been confusing. Maine Yankee can identify a couple of related areas that may have led to NRC's conclusion that a CoC change was required, neither of which have a basis in regulation:

1. The NOV notes "During the icing condition the coefficient of friction between the VCC and the concrete pad was not in noncompliance [sic] with CoC No. 1015, Section B.3.4.2.6...". TS B.3.4.2.6, and its underlying FSAR analysis only deal with a friction coefficient between the VCC and pad, establishing the conditions necessary for "no sliding" when the VCC is in contact with the pad during a seismic event. During direct contact between pad and VCC the coefficient of friction is always greater than 0.5. As noted above, however, during icing the VCC was not directly in contact with the pad and the notion of VCC/pad friction coefficient is meaningless. This was a new event unanticipated by the NRC or the TS. Because it was unanticipated, it is no different than any other newly identified generic safety issue, but in any case, NRC cannot support a position that a TS applies to a newly discovered condition that has different initial conditions and acceptance criteria than the TS was based upon.

2. In telephone conversations on this issue, NRC personnel suggested several times that the appropriate TS change to be made was elimination of TS B.3.4.2.6 – i.e., elimination of the requirement for a 0.5 friction coefficient between the VCC and the ISFSI pad. This is clearly inappropriate. The analysis conducted by Maine Yankee for icing had nothing to do with the friction coefficient between the VCC and the ISFSI pad. In fact, as noted above, the concept is meaningless because of an intervening layer of ice. Again, Maine Yankee's analysis did nothing to change or invalidate the previous seismic analyses setting the conditions for "no sliding" of the VCC. There is simply no relationship and, consequently, analysis of VCC icing can have no effect on TS B.3.4.2.6.

Summary of Maine Yankee's Position

The analysis for the iced VCC condition does not merit reflection in the TS/CoC because:

- It is a new analysis that changes neither the existing "no sliding" analysis in the FSAR nor the resulting 0.5 friction factor in the TS, and

- Since the analysis results demonstrate no safety significance associated with sliding during the iced condition, there is no safety parameter to add to the TS/CoC that meets the requirements of 10CFR72.44(c) or the intent of the Commission's policy statement on Technical Specification Improvements.

Based on the above, the Notice of Violation is not appropriate.

Other Considerations

1. Examples of similar situations

In operating facilities, the containment pressure limit technical specification is usually set by analyses of a large line break. Assume a facility has its containment pressure limit set by analysis of a large break loss of coolant accident (LBLOCA). In preparing for a new operating cycle, safety analysts question if a main steam line break (MSLB) may be more limiting and conduct an analysis. If the LBLOCA remains limiting, the new MSLB analysis is still included in the FSAR, but no TS change is made.[9]

Generic safety issues are identified by NRC and the licensees from time to time. A current outstanding issue is PWR containment sump blockage. This complex issue had at times appeared to have been resolved yet continues to be revisited as new operational events occur. For instance, a change in direction occurred when some recent Licensee Event Reports (LERs) and an NRC risk study suggested that blockage of the containment sump in PWRs could still impede ECCS operation. As a result, NRC extended the scope of this generic issue with the recent Bulletin 2003-01 (6/9/03), requiring licensee analysis and, if necessary, compensatory actions. NRC has not suggested that licensees failed to update applicable Technical Specifications even though licensee LERs (like Maine Yankee's corrective active document for the iced VCC) could be read as implying the need for new Technical Specifications. Instead, NRC is treating the sump blockage issue generically, and will identify new TSs generically as needed. Similarly, the VCC icing issue is not unique to Maine Yankee and should be treated as any other generic safety issue through standard NRC processes.

2. Review of NOV response

In Maine Yankee's view, there is only one issue to be resolved: Is a change to the TS/CoC merited based on analysis of a newly discovered condition? The heart of the answer lies in the TS requirements of 10CFR72.44(c) and the Commission's intent underlying the TS improvement program (i.e., safety significance of the analysis results). Consequently, we believe review of our NOV response should be conducted, in part, by an NRC reviewer expert in the TS improvement program and the requirements associated with TSs.

[9] The comparison of this situation to the VCC iced condition is not perfect. That is, the 0.5 friction factor does not reflect a "bounding" condition. Rather, the point is that the MSLB analysis (like the slipping analysis for the VCC) had no effect on, nor changed the pre-existing LBLOCA (or "no slipping") analysis. Consequently, no TS change was needed in either situation.

Conclusion

While Maine Yankee denies the NOV, we would be happy to work further with the Staff to examine the ISFSI TSs to determine if changes are appropriate. For instance, while the iced condition did not affect the VCC/pad friction factor TS, it is also clear that this TS serves little, if any, safety function. There may be a wide range of such TSs that serve to confuse and distract attention from safety significant licensee and regulator activities and whose elimination would benefit the industry and the NRC.

Very truly yours,

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